CLAIMS

1. A method of determining a preferred grouping scheme, comprising:

(A) modifying a first original object set to yield a first modified object set, wherein the first original object set and the first modified object set are of different cardinalities;

(B) modifying a second original object set to yield a second modified object set;

(C) calculating a value of a metric taken at least on the first and second modified object sets; and

(D) repeating any of (A) and (B) based at least on the value of the metric.

2. The method of claim 1 wherein the second original object set and the second modified object set are of different cardinalities.

3. The method of claim 1, wherein (A) comprises aggregating and a cardinality of the first modified object set is less than a cardinality of the first original object set.

4. The method of claim 1, wherein (A) comprises refining and a cardinality of the first modified object set is greater than a cardinality of the first original object set.

5. The method of claim 1, wherein (A) comprises both aggregating and refining.

6. The method of claim 1, further comprising:

(E) associating at least one element of the first modified object set with at least one element of the second modified object set.

7. The method of claim 1, wherein (C) comprises calculating a pair association value corresponding to an association between at least one element of the first modified object set and at least one element of the second modified object set.

8. The method of claim 1, further comprising:

(E) associating the first modified object set and the second modified object set.

9. The method of claim 1, wherein (C) comprises calculating an overall association value corresponding to an association between the first modified object set and the second modified object set.

10. The method of claim 9, wherein the overall association value is a function of at least one pair association value.

11. The method of claim 1, wherein the value of the metric is optimal with respect to a set of admissible functions of the first and second modified object sets.

12. The method of claim 11, wherein a value of the admissible functions comprise admissible associations between at least one element of the first modified object set and at least one element of the second modified object set.

13. The method of claim 1, wherein the original object sets comprise categories of categorical data sets.

14. The method of claim 1, further comprising:

(E) converting elements of any object set from a first type of objects to a second type of objects.

15. The method of claim 1, wherein the first and second original object sets are identical.

16. The method of claim 1, further comprising:

(E) determining whether any of the first and second modified object sets has converged.

17. The method of claim 1, further comprising:

(E) determining whether a matrix defined by a cross-space of the first and second modified object sets has converged.

18. The method of claim 1, further comprising:

(E) determining whether a function of a matrix defined by a cross-space of the first and second modified object sets has converged.

19. The method of claim 18, wherein (E) comprises determining whether a pair association value corresponding to an association between at least one element of the first modified object set and at least one element of the second modified object set has converged.

20. The method of claim 18, wherein (E) comprises determining whether an overall association value corresponding to an association between the first and second modified object sets has converged.

21. The method of claim 1, further comprising:

(E) determining whether a permutation, signifying an ordering, of any of the first and second modified object sets has converged.

22. The method of claim 1, wherein a matrix defined by a cross-space of the first and second original object sets is populated with live data such that the matrix is dynamic.

23. The method of claim 1, wherein (C) comprises calculating a value of a metric taken on a matrix, wherein the matrix defined by a cross-space formed by the first and second modified object sets and, wherein the metric is a linear arithmetic operation on a plurality of elements of the matrix.

24. The method of claim 23, wherein the operation comprises a trace.

25. The method of claim 1, wherein the first original object set comprises elements corresponding to groups of customers and the second original object set comprises elements corresponding to groups of products.

26. A method of determining a preferred grouping scheme, comprising:

(A) modifying a first original object set to yield a first modified object set, wherein the first original object set and the first modified object set are of different cardinalities;

(B) modifying a second original object set to yield a second modified object set;

(C) ordering the first and second modified object sets to yield respective first and second ordered modified object sets;

(D) calculating a value of a metric taken at least on the first and second ordered modified object sets; and

(E) repeating any of (C) and (D) based at least on the value of the metric.

27. The method of claim 26, further comprising:

(F) repeating any of (A) and (B) based at least on the value of the metric.

28. A method of determining a preferred grouping scheme, comprising:

(A) modifying a first original object set to yield a first modified object set, wherein the first original object set and the first modified object set are of different cardinality;

(B) modifying a second original object set to yield a second modified object set;

(C) calculating a value of a metric taken at least on the first and second modified object sets; and

(D) repeating (A), (B) and (C) until a stopping criterion is satisfied.

29. The method of claim 28, wherein the stopping criterion is a function of the value of the metric.

30. A method of associating objects, comprising:

(A) associating at least one element of a first object set with at least one element of a second object set; and

(B) checking whether an association obtained in (A) yields a consistent outcome.

31. The method of claim 30, wherein (B) comprises checking whether a function of the association is consistent.

32. The method of claim 30, wherein the association in (B) is consistent.

33. The method of claim 30, wherein (B) comprises checking whether at least one element of a matrix defined over a cross-space of the first and second object sets is consistent.

34. The method of claim 30, wherein the first and second object sets are obtained by:

(C) modifying a first original object set to yield the first object set; and

(D) modifying a second original object set to yield the second object set.

35. The method of claim 34, wherein (B) comprises checking whether any of the first and second object sets is consistent.

36. The method of claim 34, wherein the objects comprise live data collected dynamically by a data processing system.

37. The method of claim 34, wherein (D) comprises checking whether a cost metric has reached a sufficiently stable value to be considered consistent.

38. The method of claim 34, wherein (D) comprises checking whether an object set has reached a sufficiently stable composition to be considered consistent.

39. The method of claim 34, wherein (D) comprises checking whether an association between particular sets of elements of two object sets has reached a sufficiently stable value to be considered consistent.

40. The method of claim 34, wherein (D) comprises checking whether associations between substantially all elements of two object sets have reached sufficiently stable values to be considered consistent.

41. A method of determining a preferred grouping scheme, comprising:

(A) modifying a first original object set to yield a first modified object set;

(B) modifying a second original object set to yield a second modified object set;

(C) calculating a value of a metric given by a non-commutative function of at least the first and second modified object sets; and

(D) repeating any of (A) and (B) based at least on the value of the metric.

42. The method of claim 41, wherein the non-commutative function has a range which (i) is not spanned by an image of a set of admissible modifications of the first original object set through the non-commutative function while fixing a modification of the second original object set, and (ii) is not spanned by an image of a set of admissible modifications of the second original object set through the non-commutative function while fixing a modification of the first original object set.

43. The method of claim 41, wherein (A) and (B) comprise permuting the first and second original object sets, respectively.

44. The method of claim 41, wherein (A) comprises aggregating and a cardinality of the first modified object set is less than a cardinality of the first original object set.

45. The method of claim 41, wherein (A) comprises refining and a cardinality of the first modified object set is greater than a cardinality of the first original object set.

46. The method of claim 41, wherein (A) comprises both aggregating and refining.

47. A method of obtaining a preferred ordering of a first and a second object set, the first and second object sets having a cross-space defining a matrix *H*, the method comprising:

(A) choosing a first initial permutation, *P1*, corresponding to an ordering of the first object set;

(B) solving a first linear program, *max[f(P1, H, P2)]=G1*, for a second permutation, *P2*, corresponding to an ordering of the second object set while keeping *P1* fixed;

(C) solving a second linear program, *max[f(P1, H, P2)]=G2*, for *P1* while keeping *P2* fixed; and

(D) repeating (B) and (C) until any of *G1* and *G2* satisfies a predetermined convergence criterion.

48. The method of claim 47, wherein the matrix *H* is a matrix representing a distribution over the cross-space of the first and second object sets.

49. The method of claim 47, wherein *P1* and *P2* are matrices and (*P1 H P2*) represents a matrix multiplication and *f* is a function defined on (*P1 H P2*).

50. The method of claim 47, wherein *P1* is an aggregation matrix whose elements are either zeroes or ones and whose columns each sums to exactly 1 and whose rows each sums to a value greater or equal to 1.

51. The method of claim 47, wherein *P2* is an aggregation matrix whose elements are either zeroes or ones and whose rows each sums to exactly 1 and whose columns each sums to a value greater or equal to 1.

52. A storage medium on which are coded instruction, which when executed on a data processing system cause the data processing system to:

(A) modify a first original object set to yield a first modified object set, wherein the first original object set and the first modified object set have different cardinalities;

(B) modify a second original object set to yield a second modified object set;

(C) calculate a value of a metric taken at least on the first and second modified object sets; and

(D) repeat any of (A) and (B) based at least on the value of the metric.

52. A system that performs associations on object sets, comprising:

a modifier that modifies a first original object set and a second object set to yield a first modified object set and a second modified object set;

a calculator that calculates a value of a metric taken on at least the first and second modified object sets; and

means for determining whether a function of the value of the metric is consistent.

53. The system of claim 52, wherein the modifier is an aggregator that aggregates a subset of any of the first and second original object sets to yield a corresponding first and second aggregated object sets.

54. The system of claim 52, wherein the modifier is a refiner that refines a subset of any of the first and second original object sets to yield a corresponding first and second refined object sets.

55. The system of claim 52, wherein the modifier is a permuter that permutes a subset of any of the first and second original object sets to yield a corresponding first and second permuted object.

56. The system of claim 52, wherein the calculator calculates the function as a trace of a matrix defined by a cross-space formed by the first and second modified object sets.

57. The system of claim 52, wherein the value of the metric is an association value.

58. A method of associating objects, comprising:

(A) associating at least one element of a first original object set with at least one element of a second original object set;

(B) modifying elements of the first original object set, producing thereby a first modified object set;

(C) modifying elements of the second original object set, producing thereby a second modified object set; and

(D) associating at least one element of the first modified object set with at least one element of the second modified object set.

59. The method of claim 58, wherein (B) comprises aggregating elements of the first original object set, producing thereby a first aggregated object set.

60. The method of claim 58, wherein (C) comprises aggregating elements of the second original object set, producing thereby a second aggregated object set.

61. The method of claim 58, wherein the first original object set has a first original number of elements and the second original object set has a second original number of elements, and wherein the first aggregated object set has a first modified number of elements and the second aggregated object set has a second modified number of elements.

62. The method of claim 61, wherein the first modified number of elements is less than or equal to the first original number of elements, and wherein the second modified number of elements is less than or equal to the second original number of elements.

63. The method of claim 58, further comprising computing a pair association value between the at least one element of the first aggregated object set and the at least one element of the second aggregated object set.

64. The method of claim 58, further comprising computing an overall association value corresponding to an overall match between the first and second original object sets.

65. The method of claim 58, further comprising computing an overall association value corresponding to an overall match between the first and second aggregated object sets.

66. The method of claim 58, further comprising, following (A):

(E) calculating a pair association value representative of a metric corresponding to an association between the at least one element of the first original object set and the at least one element of the second original object set.

67. The method of claim 58, further comprising.

(E) optimizing an association between the first and second original object sets.

68. The method of claim 58, further comprising, following (A):

(E) calculating an overall association value representative of a metric corresponding to an association between the first and second original object sets.

69. The method of claim 68, wherein the overall association value is an optimal association over a plurality of possible associations of the first and second original object sets.

70. The method of claim 58, wherein the grouping of the elements of the first original object set in (B) yields a first aggregated object set whose association with the second aggregated object set yields an optimum overall association value.

71. The method of claim 58, further comprising, following (D):

(E) calculating a pair association value representative of a metric corresponding to an association between the at least one element of the first aggregated object set and the at least one element of the second aggregated object set.

72. The method of claim 58, further comprising.

(E) optimizing an association between the first and second aggregated object sets.

73. The method of claim 58, further comprising, following (D):

(E) calculating an overall association value representative of a metric corresponding to an association of the first and second aggregated object sets.

74. The method of claim 73, wherein the overall association value is an optimal association over a plurality of possible associations of the first and second aggregated object sets.

75. The method of claim 73, wherein the overall association value is represented by a number.

76. The method of claim 58, wherein the objects comprise live data collected dynamically by a data processing system.

77. The method of claim 58, wherein the first and second original object sets are identical.

78. The method of claim 58, wherein the first and second aggregated object sets are identical.

79. The method of claim 58, wherein any of (A) and (B) comprises operating on any of the first and second original object sets using an aggregation set which operates on the same any of the first and second original object sets by way of an operator.

80. The method of claim 79, wherein the aggregation set is a matrix.

81. The method of claim 79, wherein act of operating on any of the first and second original object sets comprises matrix multiplication.

82. The method of claim 58, wherein at least one element of the first original object set and at least one element of the second original object set are not associated with one another.

83. The method of claim 58, wherein at least one element of the first aggregated object set and at least one element of the second aggregated object set are not associated with one another.

84. The method of claim 58, wherein at least one element of the first aggregated categorical data set and at least one element of the second aggregated categorical data set are not associated with one another.

85. The method of claim 58, further comprising:

(E) grouping elements of a third original object set, producing thereby a third aggregated object set; and

(F) associating at least one element of the third aggregated object set with an element of any of the first and the second aggregated object sets.

86. The method of claim 58, further comprising.

(E) checking whether any of the object sets and associations thereof are consistent.

87. The method of claim 86, wherein (E) comprises checking whether a cost metric has reached a sufficiently stable value to be considered consistent.

88. The method of claim 86, wherein (E) comprises checking whether an object set has reached a sufficiently stable composition to be considered consistent.

89. The method of claim 86, wherein (E) comprises checking whether an association between particular sets of elements of two object sets has reached a sufficiently stable value to be considered consistent.

90. The method of claim 86, wherein (E) comprises checking whether associations between substantially all elements of two object sets have reached sufficiently stable values to be considered consistent.

91. The method of claim 58, further comprising:

(E) providing an output representing an association model indicative of a preferred association between the first aggregated object set and the second aggregated object set.

92. The method of claim 91, wherein the association model approximates a tendency distribution.

93. A method of associating objects, comprising:

(A) segmenting a first object set into a first plurality of object subsets;

(B) segmenting a second object set into a second plurality of object subsets;

(C) associating at least one element of the first plurality of object subsets with at least one element of the second plurality of object subsets using an association operation; and

(D) checking whether the association operation is consistent.

94. The method of claim 93, wherein the objects comprise live data collected dynamically by a data processing system.

95. The method of claim 93, wherein (D) comprises checking whether a cost metric has reached a sufficiently stable value to be considered consistent.

96. The method of claim 93, wherein (D) comprises checking whether an object set has reached a sufficiently stable composition to be considered consistent.

97. The method of claim 93, wherein (D) comprises checking whether an association between particular sets of elements of two object sets has reached a sufficiently stable value to be considered consistent.

98. The method of claim 93, wherein (D) comprises checking whether associations between substantially all elements of two object sets have reached sufficiently stable values to be considered consistent.

99. A method of associating live data, collected by a data processing system, the method comprising:

(A) sequentially receiving the live data in discrete packets;

(B) placing the live data from (A) into at least one dynamic data set;

(C) augmenting the at least one dynamic data set with new live data as the new live data is received according to (A);

(D) forming at least two categorical data sets from the elements of the at least one dynamic data set;

(E) segmenting a first categorical data set into a first plurality of categorical data subsets;

(F) segmenting a second categorical data set into a second plurality of categorical data subsets; and

(G) associating at least one element of the first plurality of categorical data subsets with at least one element of the second plurality of categorical data subsets using an association operation.

100. The method of claim 99, further comprising:

(H) grouping elements of the at least two categorical data sets, producing thereby at least two corresponding aggregated categorical data sets.

101. The method of claim 99, further comprising:

(H) checking whether the association operation is consistent.

102. A method for approximating a tendency distribution corresponding to raw data from a plurality of object sets, comprising:

(A) preconditioning the raw data into a form suitable for association;

(B) segmenting the raw data into at least two fine-level subsets;

(C) performing a first association operation between the at least two fine-level subsets;

(D) aggregating the fine-level subsets to coarse-level subsets corresponding to the fine-level subsets;

(E) performing a second association operation between the at least two coarse-level subsets; and

(F) comparing results from the first association operation and the second association operations.

103. The method of claim 102, further comprising: repeating acts (B) through (F), wherein the coarse-level subsets in (D) are redefined as fine-level subsets as in (C).

104. The method of claim 102, wherein the raw data is numerical data.

105. The method of claim 102, wherein the raw data is ordinal data.

106. The method of claim 102, wherein the raw data is categorical data.

107. The method of claim 102, wherein (A) comprises generating categorical data sets corresponding to the raw data.

108. An information filtering system comprising:

a profile subsystem for defining a space of profile data with a particular taxonomy, and for identifying users into a particular partition or category of this predefined taxonomy;

a manipulatable collaboration subsystem, based on feedback of site usage and a popular decision rule, for identifying a particular suite of content data and delivery scheme to associate with each partition in the profile taxonomy;

a content delivery subsystem for delivering particular content in combinations, sequences, and schemes as decided by the collaboration subsystem; and

a visualization and analysis subsystem for engaging projections of the collaboration subsystem by either profile-based category or content-based scheme, including category and content indicators indicating other profiles or content that is similar to the object of analysis.

109. The system of claim 108, wherein the collaboration subsystem is manipulatable by injecting predefined associations of content data and delivery schemes with particular profile categories resulting in at least:

(A) a clear benchmark to measure value of the system by comparing usage resulting from the engine to that of usage resulting from an analysts best prediction of users' preferences; and

(B) a method of measuring market elasticity by injecting price differences in the engine at various intervals and observing the resulting site behavior.

110. The system of claim 108, wherein the collaboration subsystem defines a predictive model of consumer behavior and can be used to simulate market dynamics to facilitate predictive analysis.

111. A method for conducting electronic commerce, comprising:

(A) segmenting a customer base into a plurality of customer segments based on a set of customer attributes;

(B) segmenting a product base into a plurality of product segments based on a set of product attributes;

(C) matching a customer segment and a product segment based on a plurality of commercial activity events;

(D) creating a matrix of customer segments and product segments containing information from joint correlation operations; and

(E) providing the information in the matrix in a manner usable for making marketing decisions in an electronic commerce system.

112. The method of claim 111, wherein the matrix is multidimensional.

113. The method of claim 111, wherein the segments are defined dynamically.

114. A method for deriving correspondence between two interactive data sets, comprising:

(A) dividing a first data set into a plurality of first data set segments;

(B) dividing a second data set into a plurality of second data set segments;

(C) evaluating a joint distribution matrix to determine a relevance indicator for indicating relative relevance of the first and second data set segments to one another;

(D) subdividing the first and second data set segments into finer segments and performing act (C) on the finer segments;

(E) aggregating the data set segments into coarser data set representations having fewer segments if the relevance indicator indicates a lack of relevance between the first and second data set segments; and

(F) exiting the process when the relevance indicator meets a preset condition.